

STEM Education for Innovation: Experimento India

Teacher's Manual: Electricity Part 2

Manual at a glance

This manual is made to help teachers use the Electricity part-2 OERs using the Inquiry-Based Learning approach in classrooms.

Sr. No.	Topic / Concept	Description
1	Introduction	Overview of the package and pedagogical approach
2	OER types included in the package	Overview of resource types (videos, reading material, stories, surveys, questions)
3	How to conduct this package in the classroom?	General guidelines before, during and after the lesson along with safety instructions/precautions
4	Lesson plans	Instructions and detailed lesson plans for each concept/resource

Lesson plans

Sr. No.	Topic / Concept	Resource Name Learning Outcome	Time Required	Textbook Link
4.1	Electricity and its flow	Electric Current - A flow of Electrons Learn that electricity is the flow of electrons and understand how free electrons help in the flow of electric current.	30–40 min (video + discssion)	NCERT Class-10, Chapter 11: Electricity. 

Teacher's Manual: Electricity Part 2

Sr. No.	Topic / Concept	Resource Name Learning Outcome	Time Required	Textbook Link
4.2	Electricity and its flow	Why Conductors Conduct? Understand, at the atomic level, why conductors allow electricity to flow and insulators do not.	30–40 min (video + discssion)	NCERT Class-10 Chapter 11: Electricity. 
4.3		Potential and Potential Difference: Understand the concept of potential and potential difference in electricity, and the role of potential difference in the flow of electricity.	30–40 min (video + discssion)	NCERT Class-10 Chapter 11: Electricity. 
4.4	Electricity generation and its transmission	Generating Electricity: Mechanical to Electrical Understand how electricity is generated using turbines and magnets, and how energy is transformed from mechanical to electrical.	30–40 min (video + hands-on activity)	NCERT Class-7 Chapter 3: Electricity - Circuits and their Components 
4.5		Generating Electricity: Chemical to Electrical Understand how electricity can be generated from chemical energy, and learn how cells and batteries work.	30–40 min (Reading material + discssion)	Class-8 Chapter 4: Electricity - Magnetic and Heating Effects 

Teacher's Manual: Electricity Part 2

Sr. No.	Topic / Concept	Resource Name Learning Outcome	Time Required	Textbook Link
4.6	Electricity generation and its transmission	Journey of Sparky, the Electron Learn about electricity's journey from power plants to homes and the roles of transformers, transmission lines, meters, and fuses in its distribution.	30 min (video + discussion)	NCERT Class-7 Chapter 3: Electricity - Circuits and their Components 
4.7	Complex circuit	Series circuit Understand what a series circuit is, how it works, and connect it to real-life examples.	30–40 min (video + hands-on activity)	
4.8		Parallel circuit Understand how parallel circuits work and relate them to real-life situations, such as home wiring.	30–40 min (video + hands-on activity)	
4.9		Game: Series and Parallel Circuit Understand the difference between series and parallel circuits, how electric current flows in each, and the effect of a disruption in both.	30–40 min (Reading material + Play + discussion)	
4.10	Units of electricity	Electricity: Units and Terms Understand basic electricity terms, common electrical units, and their connection to everyday life.	30–40 min (reading material + discssion)	

Teacher's Manual: Electricity Part 2

1. Introduction

Electricity plays a very important role in our daily life. It is an invisible force – we cannot see it, but it works for us, from lighting our homes to running our machines and devices. To get electricity, we have to change different forms of energy into electrical energy. For example:

Wind energy - Electrical energy,
Water energy - Electrical energy,
Chemical energy - Electrical energy
Solar energy - Electrical energy

At the same time, the flow of electricity also follows some fixed rules. In this series, we will try to explain these advanced ideas of electricity to children in very simple language. Children will be able to understand these concepts easily through observation, exploration, and working models.

This teacher's manual has been designed to support educators of class 6th–8th in using the digital open educational resources (OERs) based on Energy in their classrooms. The OERs can also be used flexibly by parents at home or by students themselves for self-learning. Each resource is self-explanatory and aligned with the NCERT curriculum.

The Electricity Part - 2 OERs are built on inquiry-based learning and constructivist pedagogy. Instead of being passive recipients of information, children actively explore, ask questions, investigate, and build their own understanding. This method encourages curiosity and critical thinking, which are vital for learners to develop independent thinking.

In the inquiry-based model, teachers act as facilitators who guide students to explore real-world problems, gather evidence, and make connections. For example, instead of telling students the principles of evaporation, a teacher might encourage them to design a simple experiment to observe how water disappears under different conditions. This approach not only deepens content knowledge but also develops problem-solving and research skills.

The constructivist approach emphasizes that learners construct knowledge from their experiences. Middle school students bring prior knowledge, beliefs, and everyday experiences into the classroom and teachers build on these foundations. Group work, discussions, projects, and hands-on activities are used to help children learn collaboratively and deepen understanding. This makes learning meaningful and long-lasting.

Teacher's Manual: Electricity Part 2

Together, these approaches help to create classrooms where children are active participants, confident learners, and capable problem-solvers, skills that are essential not only for academic success but also for life beyond school.

There are several methodologies to implement Inquiry-based learning and the Constructivist approach in the classrooms. Here, we are using a 'Five E methodology'. This manual provides practical and easy-to-follow lesson plans for classroom teaching. It has the following 5 steps:



This manual provides teachers with ready-to-use lesson plans, activity instructions, materials lists, guiding questions, and Learning Outcomes for each OER, so classroom teaching becomes easier, more engaging, and directly supportive of curriculum.

Teacher's Manual: Electricity Part 2

2. OER types included in the package

This package provides a variety of OERs designed to engage students in learning through observation, inquiry, and hands-on activities. The resources include:



a. Videos

- Short and engaging videos explaining key concepts related to the topic
- Can be shown in class or shared for students to watch in groups or at home



b. Reading material

- Simple, illustrated content to explain the core concepts
- Includes real-life examples and applications for better understanding and to encourage discussion



c. Audio Stories

- Short and engaging audio narratives explaining key concepts related to the topic
- Include real-life examples and prompts for critical thinking



d. Suggested research questions

- Thought-provoking prompts are included in the resources
- Can be used for class discussions, homework, or small projects to extend learning

3. How to conduct this package in the classroom?

a. Before the activity



Form student groups: Divide the class into small groups (4–5 students) to encourage teamwork and peer learning.



Assign roles: Give responsibilities such as material collector, recorder, presenter, or timekeeper.



Share materials list in advance: Provide a simple materials list (low-cost/ everyday items) so students can bring them from home.

Teacher's Manual: Electricity Part 2



Set up the classroom: Arrange equipment such as a projector/blackboard for videos, or prepare printouts/handouts for reading material and worksheets.

b. During the activity



Introduce the Resource: Show the video, distribute reading material, or explain the task clearly.



Group Work: Ask students to watch, read, or perform the activity in their groups, noting key observations.



Guide Exploration: Circulate among groups, prompt with guiding questions, and encourage them to compare findings.



Record Observations: Remind students to use survey forms or worksheets where provided, or ask them to record observations in the tables given in the particular resource.

c. After the activity



Discussion & Reflection: Facilitate a short group/class discussion where students share their conclusions. Highlight how the concept connects to real-life problems and solutions.



Connect to Key Concepts: Summarize the scientific ideas, clarify misconceptions, and link to textbook content.



Ask Guiding Questions: Use the suggested research prompts in the resources to spark further thinking and discussion.



Feedback & Motivation: Appreciate student efforts and encourage them to explore the concept independently.



Homework/Extension (Optional): Assign follow-up tasks such as simple research, a 1-day observation, or creating a poster/action plan.

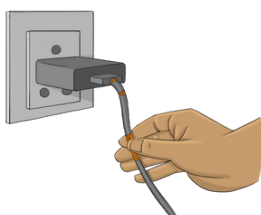
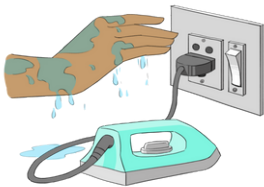
Teacher's Manual: Electricity Part 2



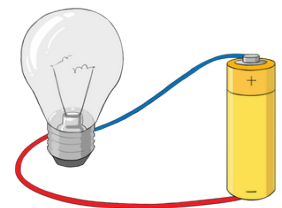
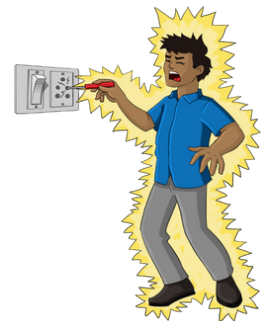
Record observations: Remind students to use survey forms or worksheets where provided, or ask them to record observations in the tables given in the particular resource.

Safety instructions

1. General precautions



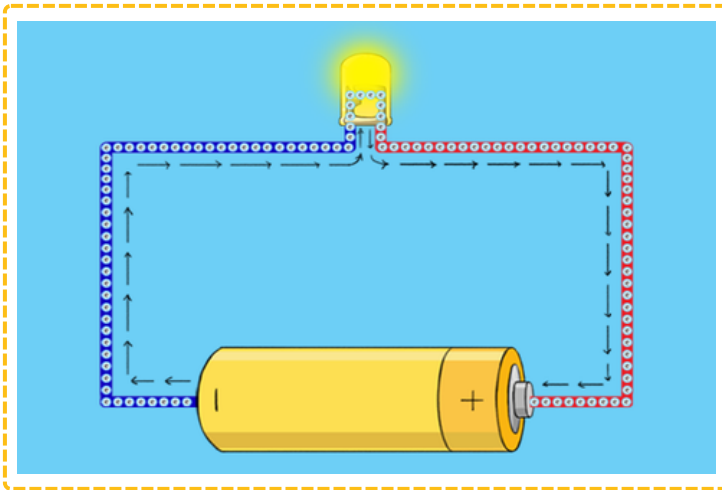
- Avoid touching electrical appliances, switches, or wires with wet hands or a wet cloth
- Avoid touching open wires
- Do not touch the pins while connecting plugs to the electric sockets
- Do not touch the metal portions of the bulb or the holder while fixing an electric bulb
- Do not connect wires connected to the power source to each other. Doing so may cause a short circuit, which may cause a fire.
- Always wear dry rubber footwear while working with electricity
- In case of a short circuit, shut down the power supply immediately
- Always disconnect the wires from the battery or cell when experiments are not being performed. This will prevent the draining of the battery or cell, and the wires will not become hot.
- Use a battery or cell of 9 volts or less when conducting electrical experiments
- Do not throw discharged cells in the waste. Segregate them as e-waste (electronic waste). Give this e-waste to an organization or agency responsible for its safe disposal, or keep it safe with you.



Teacher's Manual: Electricity Part 2

4. Lesson plans

4.1 Electric Current – A Flow of Electrons



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Learn to define electricity is due to flow of electrons
- Understand the structure of an atom and identify the charges of protons, electrons, and neutrons
- Understand how free electrons in conductors help in the flow of electric current
- Learn to differentiate between conductors and insulators
- Understand the importance of electric current in daily life

Materials:

- Copper wire (small piece)
- Plastic/wooden stick (as an insulator)
- Chart of atomic structure (or simple drawing on the board)
- Battery and LED (optional demo)

Teacher's Manual: Electricity Part 2

5E Lesson plan



Ask:

- What kind of energy powers your bulb, fan, or TV?
- What would happen if there was no electrical energy at all?
- What exactly is electricity, and how does it flow through wires?



Show the video till 1.45 minutes to children and ask to explore:
When we talk about the flow of electricity, what actually flows?

Let children see the video and discuss.



Play the explanation part of the video from 1:45 minutes to the end.

Explain how electrons carry an electrical charge, and thus, the flow of electrons is the flow of electric charges.

Therefore, electricity is the flow of electrons.

All elements are made of atoms, and atoms are made of electrons, neutrons, and protons.

While protons and neutrons are in the nucleus, electrons are in orbits outside the nucleus..

In the case of metal atoms, the electrons in the outermost orbits are very loosely bound to the nucleus and are capable of moving from one atom to another through the body of the metal. An external attractive force makes it easy for these mobile electrons to flow through the metal and out of it. These moving electrons (free electrons) carrying negative charges give rise to an electric current.



Extend the discussion:

- Why do you think electricity flows only in conductors and not in insulators?
- Why are electric wires made of copper/aluminum and not iron?

Discuss how free electrons make conductors useful in electrical circuits.

Electrons are extremely tiny particles carrying a very small electric charge. Then how does electricity move trains and huge machines?

Teacher's Manual: Electricity Part 2



Evaluate

Oral questions:

- What is the charge of a proton? An electron?
- What do we mean by electric current?
- Why does electricity not flow in wood or plastic?

Notebook task:

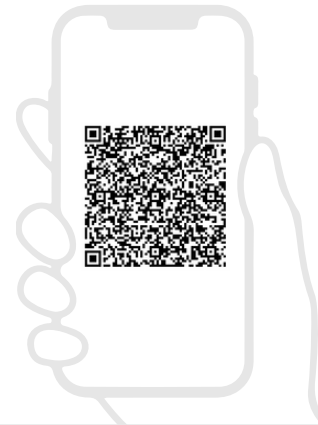
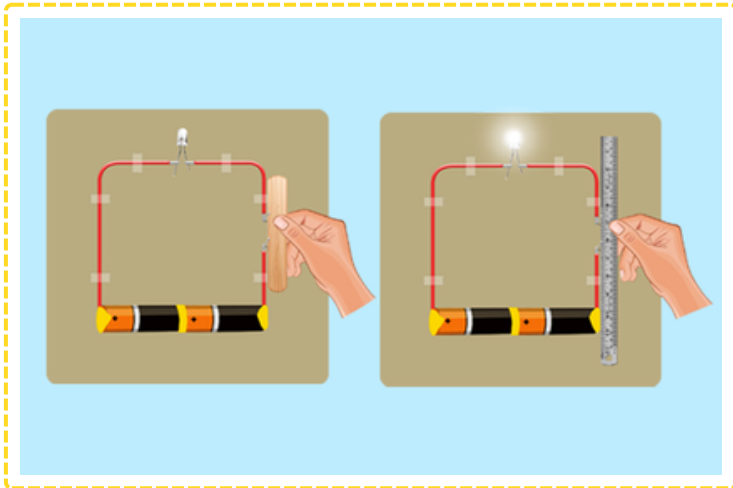
- Draw and label an atom with protons, neutrons, and electrons

Homework:

- Find out which metal wires are used in your home in electrical wires
- Can all metals be used as electrical wiring to carry electric current?
Give reasons for your answer.

Teacher's Manual: Electricity Part 2

4.2 Why Conductors Conduct?



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Learn to recall the difference between conductors and insulators
- Understand, at the atomic level, why conductors allow electricity to flow and insulators do not
- Understand the connection between free electrons and the flow of current
- Learn to apply this knowledge to real-life situations, such as why copper and aluminum are used for wires

Materials:

- Video: Why Conductors Conduct?
- Blackboard/Chart to draw atoms (with nucleus, shells, electrons)
- Simple circuit kit (cell, bulb, wires, materials like wood, steel, plastic, copper wire)
- Notebook and pencil for student answers

Teacher's Manual: Electricity Part 2

5E Lesson plan



Engage

Begin with a question:

- Electricity comes to our homes through wires. What are these wires made of?

Recall:

- Earlier we tested wood and steel in a circuit. Why did the bulb glow with steel but not with wood?

Ask:

- Both are made of atoms. Both have electrons. So why does electricity flow through one and not the other?



Explore

Play the video till 2.23 minutes Ask students to think-pair-share: What did you notice about atoms of conductors vs. atoms of insulators?

Give a small activity: Draw two atoms on the board (one with loosely bound outer electrons, one with tightly bound.)

Ask groups to discuss which one is the conductor and which is the insulator.



Explain

After this, you can ask students to explain the concept in groups.

Encourage some students to draw diagrams on the blackboard and explain them.

If students are not able to understand properly, show the video again and explain it.

After that, play the entire video.



Elaborate

Real-world applications:

- Why are electric wires made of copper/aluminum and not iron?
- Do all metals conduct equally well? (Introduce the idea of good conductors vs. poor conductors)
- What are semiconductors?

Ask:

- Why do electricians wear rubber gloves when working?

Teacher's Manual: Electricity Part 2



Evaluate

Oral/written quick checks:

- What are valence electrons?
- Why can metals conduct electricity easily?
- Why can't wood or plastic conduct electricity?
- Give two examples each of conductors and insulators

Classwork:

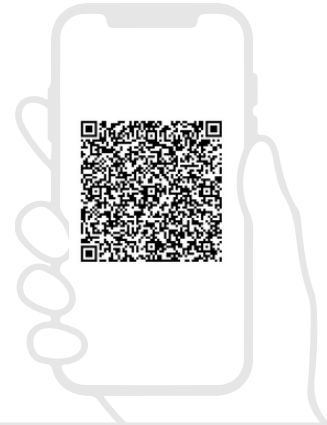
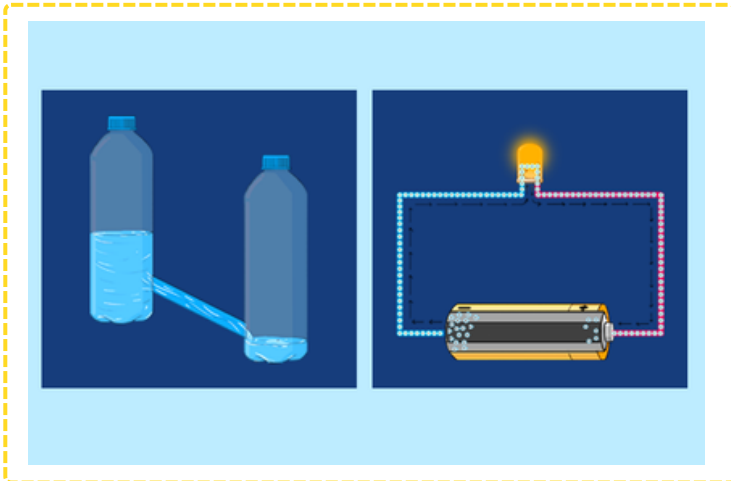
Draw a diagram showing free electrons in a conductor and tightly bound electrons in an insulator.

Homework:

Research and write in 3-4 sentences: What are semiconductors used for in daily life?

Teacher's Manual: Electricity Part 2

4.3 Potential and Potential Difference



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand the concept of potential and potential difference in electricity
- Understand the flow of electricity by relating it to the flow of water due to pressure difference
- Learn how a cell or battery creates potential difference

Materials:

- Video resource
- Chart showing potential difference voltage
- Blackboard/whiteboard

5E Lesson plan



Begin with a question:

- Why are water tanks always placed high above the ground?

Encourage students to think:

- Can electricity also flow on its own in wires? If not, what makes it flow?

Teacher's Manual: Electricity Part 2



Explore

Play the video till 2.23 minutes.

Water flows from higher to lower levels due to pressure difference.

Connect this idea to electricity: electrons need a push (potential difference) to move.

Simple activity: Show a cell connected to a bulb with wires. Ask: When does the bulb glow? Why only when both terminals are connected?

Allow students to observe carefully and note their answers.



Explain

Play the entire video and let the students understand by themselves.

Inside a cell, chemical reactions release electrons.

Electrons gather at the negative terminal and move towards the positive terminal when a path (wire) is available.

The difference in accumulation of electrons between two points is called potential difference.

Relate to the water analogy: water flows from higher pressure to lower pressure; electrons flow from higher potential to lower potential.

Clarify:

- Negative terminal has lower potential
- Positive terminal has higher potential
- Introduce the term: Volts (V) to measure Potential Difference



Elaborate

Show examples from daily life:

- Cells marked 1.5 V
- Batteries marked 9 V
- Household appliances with 220–240 V

Ask:

- Why do different devices need different potential differences?

Extend the analogy: Just like taps won't get water without the pressure difference from the tank, bulbs won't glow without potential difference in the circuit.

Discuss:

- This principle works for electricity from hydroelectric dams, wind turbines, or any source

Teacher's Manual: Electricity Part 2



Evaluate

Quick oral/written questions:

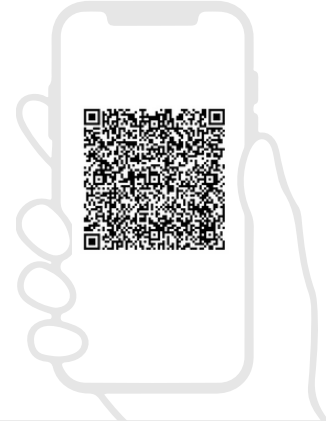
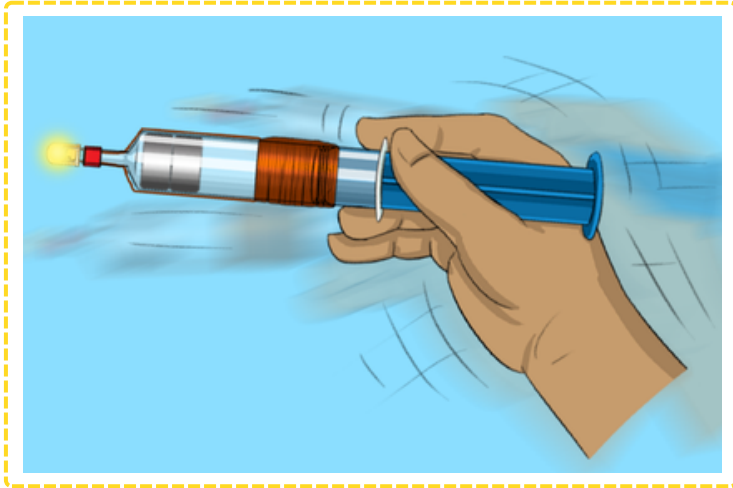
- What is meant by potential difference?
- Which terminal of a cell has higher potential?
- Potential difference is measured in which unit?
- Why do electrons flow from the negative terminal to the positive terminal?
- What is the similarity between water flow from tanks and flow of electricity in wires?

Homework / Extension:

Observe at home: Find and list at least 3 devices with their voltage ratings written on them. Write what those values mean.

Teacher's Manual: Electricity Part 2

4.4 Generating Electricity: Mechanical to Electrical



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand how electricity is generated using turbines and magnets
- Learn to relate real-life examples of hydropower, wind power, and thermal power plants with the principle of electromagnetic induction
- Learn to perform a hands-on activity to generate electricity using a coil and a magnet
- Understand the factors affecting the strength of electricity generated (coil turns, magnet strength, speed)

Materials:

- Video resource
- Neodymium magnet (18x12 mm)
- 32-gauge copper wire (20 metres)
- LED
- 10 ml syringe
- Sandpaper
- Cellotape

Teacher's Manual: Electricity Part 2

5E Lesson plan



Engage

Begin with the video showing hydropower plants, windmills, and turbines.

Ask:

- We know these spinning turbines generate electricity. But what exactly happens inside the turbines?

Pause video at 0.30 minutes and encourage students to think:

- How are the bulbs glowing in these cases?

Ask them to write or discuss their thoughts in pairs.



Explore

Show the experimental part from 0.31 minutes to 2.16 minutes and Introduce the classroom activity: making a simple electricity generator.

Guide students step by step if needed.

Students observe: LED glows!

Ask them to watch carefully: When does the LED glow brighter?



Explain

Show the explanation part of the video from 2.18 minutes till the end and let the students try to understand what is happening.

Ask students to explain different aspects of the experiment.

Explain:

Electricity is generated when a conductor cuts across magnetic lines of force. The moving magnet inside the coil creates electricity in the conductor, which lights the LED.

Emphasize:

It doesn't matter whether the magnet moves or the conductor moves, as long as there is relative motion. Electricity is generated in both cases.

Connect to real-life:

- Hydropower- water moves turbine → magnet moves inside coil → Electricity is generated
- Wind power - blades move turbine → magnet moves inside coil → Electricity is generated
- Thermal plants generate steam - steam pressure moves turbine → magnet moves inside coil → Electricity is generated
- Bicycle dynamo- wheel motion turns magnet within the coil → electricity is produced

Teacher's Manual: Electricity Part 2



Elaborate

Ask students:

- What will happen if we increase the number of turns in the coil?
- Will using a stronger magnet affect the production of electricity? In what way?
- What will you do to light up a brighter bulb?

Encourage them to test these situations in groups if materials are available.

Discuss how increasing coil turns, magnet strength, or speed of magnet movement increases electricity generation.

Link back to power plants- why turbines must rotate fast.



Evaluate

Ask students to answer orally or in writing:

- When does the LED glow brighter in your experiment?
- Why do turbines rotate in power plants?
- What is the role of magnets and coils in generating electricity?
- What if the magnet stays still but the coil moves?
- If you double the number of coil turns, what happens?

Classwork:

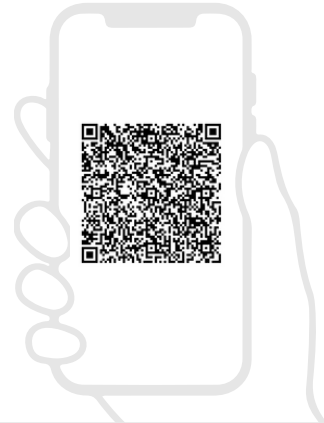
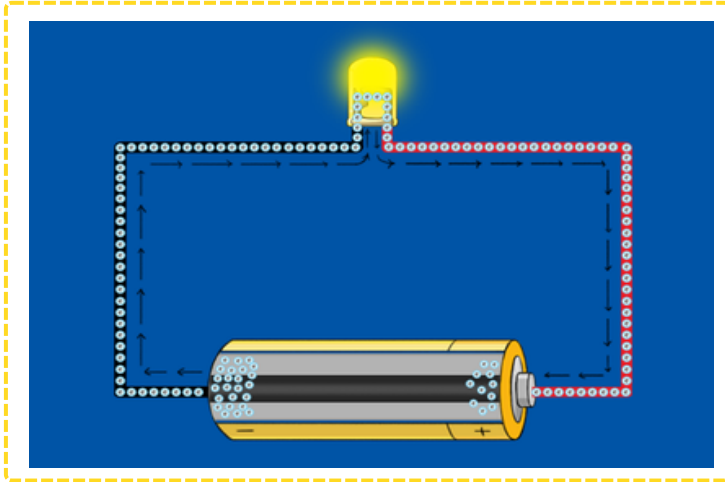
Draw and label the activity setup (syringe generator) in notebooks.

Homework:

Research and write how electricity is generated in your nearest power station (hydro, thermal, wind, or solar)

Teacher's Manual: Electricity Part 2

4.5 Generating Electricity: Chemical to Electrical



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand how electricity can be generated from chemical energy
- Learn how cells and batteries work
- Learn to identify different types of cells and batteries and their uses in daily life
- Understand how chemical energy is converted into electrical energy by creating a simple lemon battery

Materials:

- PDF resource
- Pictures of various batteries (dry cell, lithium-ion, lead-acid, coin cell, aerospace battery)

5E Lesson plan



Engage

Ask the students questions at the beginning of the resource, along with images

- How are these lights glowing?
- What type of energy is powering the clock?
- What does this mobile battery symbol mean?

Discuss:

- What if batteries didn't exist? Could you carry your phone or torch everywhere?

Teacher's Manual: Electricity Part 2



Explore

Lets students read the label of the dry cell and observe its parts (positive and negative ends)

Ask students

- What is inside the cell?
- Inside the cell, chemicals react to produce electrons, which flow to make electricity
- Connecting a bulb to a cell makes it glow

Ask:

- Why do cells stop working after some time? Let students share ideas.



Explain

Encourage students to explain:

A cell is a small container having a mixture of chemicals. When connected in a circuit, the chemicals react and chemical energy gets converted into electrical energy.

Explain the difference between a cell and a battery: A battery is a combination of cells.

Introduce types of cells and batteries with examples and where they are used:

- Dry cells – torches, remotes control devices
- Lithium-ion batteries – mobiles, laptops, e-scooters
- Lead-acid batteries – cars, trucks
- Coin cells – watches
- Aerospace batteries – rockets, satellites



Elaborate

Ask:

- Why do different devices need different kinds of batteries?
- What might happen if you use a small coin cell to run a car?

Activity:

Make a Lemon Battery

Discuss:

- What change happens if you use two lemons instead of one?

Teacher's Manual: Electricity Part 2



Evaluate

Quick check questions:

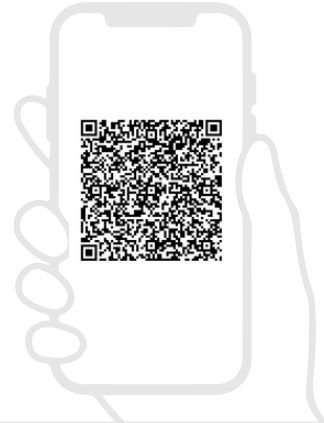
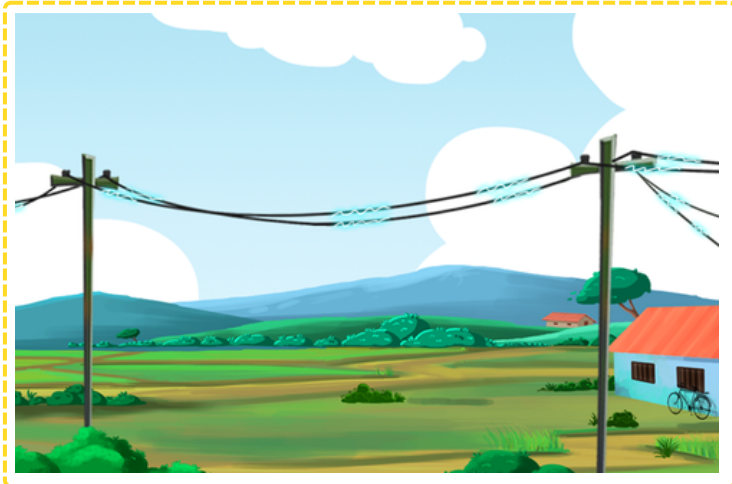
- What kind of energy transformation takes place in a cell?
- Why does a dry cell stop producing electricity after some time?
- Name three types of batteries and where they are used
- What is the difference between a cell and a battery?

Homework/Project:

Try the Lemon Battery Challenge at home with adult supervision and share observations with the class.

Teacher's Manual: Electricity Part 2

4.6 Journey of Sparky, the Electron



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand how electricity is generated at a hydroelectric power plant
- Learn about the journey of electricity from a power plant to our homes
- Understand the role of transformers, transmission lines, electric meters, and fuses in electricity distribution
- Learn to connect the flow of electrons with the working of electrical appliances in daily life

Materials:

- Video resource: Journey of Sparky, the Electron
- Blackboard/whiteboard and chalk/marker
- Pictures of hydroelectric plants, transformers, transmission lines, and electric meters
- Worksheets with fill-in-the-blanks, matching, and diagram tracing
- Access to the electricity bill of a household (for reference activity)

Teacher's Manual: Electricity Part 2

5E Lesson plan



Engage

Ask:

- Have you ever thought about where the electricity in your home actually comes from?

Pose a problem:

- When you switch on a fan, electrons move inside the wires from the switch to the fan. But how did the electrons reach your house?

Tell students:

Today we will follow Sparky's journey to find out how electricity travels from the power plant to your home.



Explore

Play the video till 0.48 minutes the part where water falls on the turbine in the hydroelectric plant.

Pause and ask:

- What kind of energy is stored in water at the dam? (Potential energy)
- What happens when water falls on the turbine? (It rotates – mechanical energy)

Continue with the video and let students observe each stage: turbine, transformer, transmission lines, distribution transformer, meter, and fuse. Encourage students to note down each step of Sparky's journey.



Explain

Go over each stage using visuals and ask the children to explain the flow of electricity.

- Hydroelectric dam → turbine spins → electricity is generated
- Transformer (step-up) → prepares electricity to travel long distances
- Transmission lines → carry electricity over long distances
- Transformer (step-down) → reduces voltage for safe use in houses, offices, schools etc
- Distribution lines → bring electricity to neighborhoods
- Fuses and meters → Fuses protect appliances and devices from damage due to overload. Meters keep track of usage of electricity.

Clarify the role of each component with simple analogies (e.g., a transformer is like a water pump that adjusts pressure in pipes)

Teacher's Manual: Electricity Part 2



Elaborate

Ask students to imagine Sparky's journey in their own house.

- Where does he come from?
- Which path does he take?

Small group task: Draw a flow diagram of Sparky's journey, labeling the dam, turbine, transformer, transmission lines, meter, and home.

Pose an inquiry question:

- Have you ever had an instance of an appliance or device (TV or Mixer-Grinder) getting damaged due to powersurges (sudden increased flow of electricity)?

Ask around to find if these instances are common.

If yes, find a solution to fix the problem

Extend thinking:

- Many houses or shops have gensets for producing electricity on a small scale
- Can you find out how they work?



Evaluate

Quick oral/written quiz:

- Where does Sparky's journey begin?
- What is the function of a transformer?
- Which lines carry electricity over long distances?
- What is the use of a fuse?
- How do we measure electricity in our homes?

Ask students to answer:

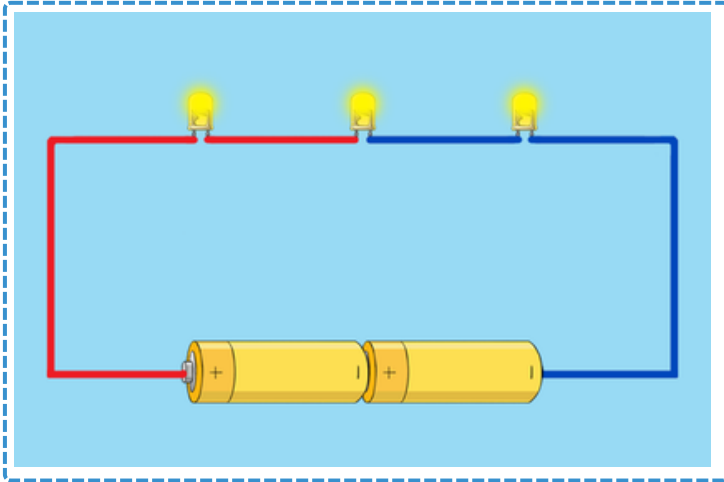
- Explain Sparky's journey in 5 steps, in your own words

Homework:

Interview parents about how much electricity is used in their home each month. Ask them to show the electricity bill and note the units consumed. Find 3 ways to reduce electric consumption in your homes.

Teacher's Manual: Electricity Part 2

4.7 Series Circuit



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand what a series circuit is and how it works
- Learn to connect real-life examples (string lights, torches, LED bulbs at home) with the concept of a series circuit
- Learn to evaluate the advantages and disadvantages of series circuits

Materials:

- 9V battery
- 30 cm insulated wire
- 3 LEDs
- Cardboard base
- Wire stripper
- All pins
- A simple LED bulb for demonstration (optional)

Teacher's Manual: Electricity Part 2

5E Lesson plan



Engage

Play the video till 1.01 minutes: Maya's LED bulb is not glowing. Is it fused?

Show how the electrician touched two points with a wire and the bulb glowed.

Ask:

- What do you think happened here? Why did the bulb light up just by touching it with a wire?

Let students pause and write down their thoughts. This will activate curiosity and delve into their experiences.



Explore

Show the experimental part from 1.07 minutes to 2.05 minutes and conduct the experiment. Guide students in setting it up if needed.

Observe together: Do all the LEDs glow?

Ask students:

- Do you notice any difference in the glowing of LEDs in the experiment LEDs as compared to a single LED in a circuit?
- Next, remove one LED or cut the wire connecting all the LEDs. Ask students what they observe.

Encourage them to share why they think this happens.



Explain

Show the explanation part of the video from 2.06 minutes to 3.27 minutes and let the students understand the Series Circuit:

The components are connected in a single path, one after the other.

Relate back to Maya's LED bulb: A LED bulb has many small LEDs connected in series. If one LED bulb fails, the entire circuit is broken.

Explain how the electrician checked each LED with a small conducting wire to find the faulty one, and then either bypassed or replaced it to complete the circuit.

Discuss advantages and disadvantages.

Encourage students to explain this in front of the class. Step in to explain again if needed.

Teacher's Manual: Electricity Part 2



Elaborate

Pose questions for application:

- What if we want only one LED to go off but the others to keep glowing?
- Can this happen in a series circuit? (Leads to parallel circuit discussion later)

Encourage students to think of other devices in daily life that use series circuits (Christmas lights, fairy lights, old torches).



Evaluate

Quick oral/written questions:

- Define a series circuit in your own words
- Why did all LEDs go off when one was removed?
- How did the electrician fix Maya's bulb?
- Name one advantage and one disadvantage of series circuits

Classwork:

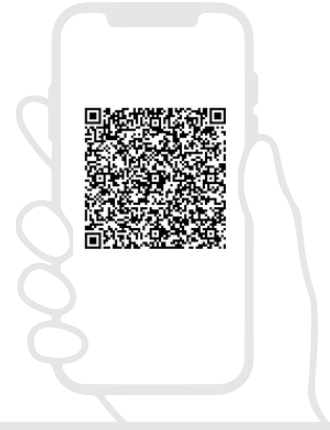
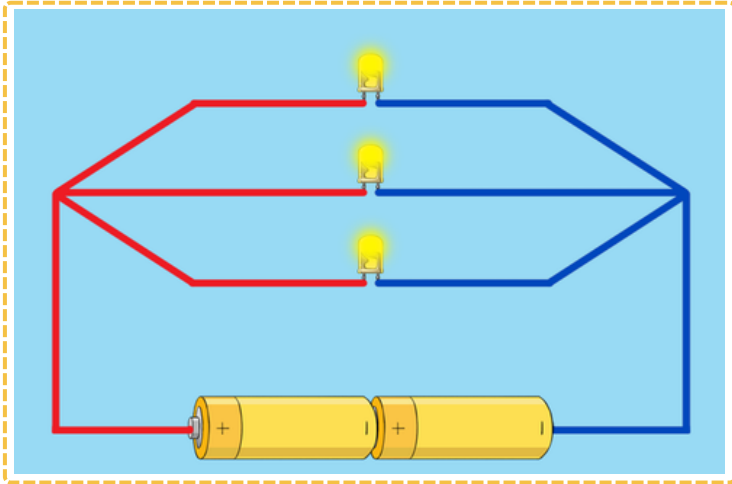
Draw a neat circuit diagram of three LEDs connected in series to a battery.

Homework:

Interview family members and list two real-life devices at home or around you that might use series circuits.

Teacher's Manual: Electricity Part 2

4.8 Parallel Circuit



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand how parallel circuits work
- Learn to relate real-life situations (like home wiring) with parallel circuits
- Learn to construct a simple parallel circuit using cells, wires, and LEDs
- Understand the advantages and limitations of parallel circuits

Materials:

- 2 cells (1.5 V each)
- 30 cm insulated wire
- 3 LEDs
- Piece of cardboard
- Wire stripper
- All pins

Teacher's Manual: Electricity Part 2

5E Lesson plan



Engage

Begin with the story:

Maya switches on lights in three rooms. The bedroom light doesn't glow, but all the others work fine. Why didn't all the lights go off together?

Ask students:

- What would happen if all devices in our homes were connected in a series?

Pause and let them predict:

- Why do some devices keep working even if one fails?



Explore

Show the experimental part till 1.50 minutes and conduct the experiment. Guide students in setting it up if needed.

Observe:

All LEDs glow

Next, remove one LED. Observe again: The other two still glow!

Encourage students to write their observations in the notebook.

Ask them to also write why they think this happens.



Explain

Show the explanation part of the video from 1.51 minutes to 3.30 minutes and let the students figure out the Parallel Circuit on their own:

Explain:

This is a parallel circuit-components are connected in multiple paths, each directly linked to the power source.

Key points:

- If one component fails, others keep working
- Each component gets the same voltage (amount of electric current).
- Adding more components doesn't affect brightness

Also understand the analogy:

Think of a dam with multiple gates. If one gate is closed, water still flows through the other gates.

Discuss advantages and disadvantages.

Encourage students to explain this in front of the class. Step in to explain again if needed.

Teacher's Manual: Electricity Part 2



Elaborate

Relate to real life:

This is why in our homes, if one bulb or fan stops, the others keep working.

Show examples:

Home wiring, car headlights, decorative lights.

Extension activity: Ask students to draw a Parallel circuit diagram with 2 paths, one containing 3 bulbs in a series. Use correct symbols of cell, wires, and LEDs.

Ask them to list the features and advantages and disadvantages.



Evaluate

Ask written/oral questions:

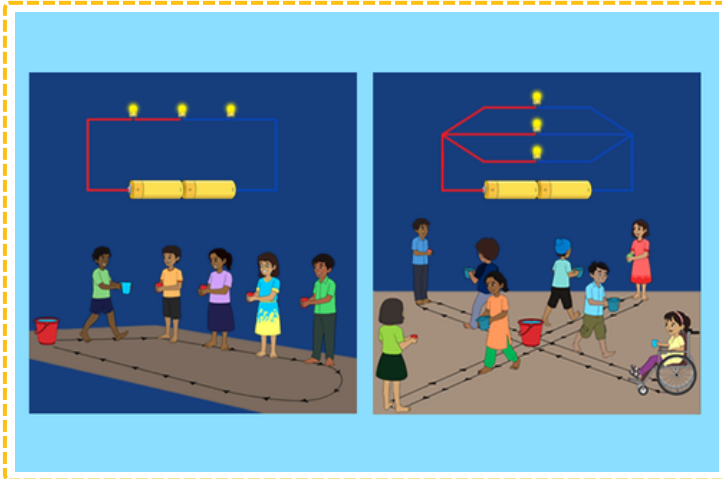
- Why does one faulty bulb not affect others in a parallel circuit?
- In a parallel circuit, what happens to the voltage across each component?
- What are advantages and disadvantages of a parallel circuit?
- Is it correct to say that if the parallel circuit in the video is broken at any one point, at least one bulb will still glow? Explain.
- Identify places in the parallel circuit where current flows through more than one path

Homework:

Draw a simple parallel circuit with two bulbs and one switch in your notebook. Label all the parts using symbols.

Teacher's Manual: Electricity Part 2

4.9 Game: Series and Parallel Circuits



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand the difference between series and parallel circuits
- Understand how electric current flows differently in the two types of circuits
- Learn the effect of a disruption in both types of circuits

Materials:

- Two buckets filled with water
- 5 paper cups of the same size
- 4 paper cups of different sizes
- 5–8 mugs
- pen space (playground or hall)

5E Lesson plan



Engage

You have learnt about Series and Parallel circuits In the last two resources. You are also familiar with the features of both types of circuits.

Today, we will play a fun game to understand these circuits better.

Teacher's Manual: Electricity Part 2



Explore

Divide the class into two groups.

Let both groups read the game instructions in their own way.

If needed, explain the rules in detail.

Then, ask them to play the game one by one.

Let the groups play the game and carefully observe what happens in both methods.

Remind students:

The bucket is the power source, water is electric current, mugs are wires, and cups are devices like bulbs or fans.



Explain

Discuss observations together:

- In the first method (one-by-one) → like a series circuit. Water (Current) flows through a single path. If one mug or cup is missing, the sequence breaks and players after that point don't get water.

In the second method (all-at-once) → like a parallel circuit. Water (Current) flows through multiple paths. If one mug or cup is removed, others still get water.

Write down the key differences on the board:

- Series: single path, same current shared by many, hence less electricity for each, less voltage, one fault stops all devices
- Parallel: multiple paths, same amount of electric supply, same voltage, one fault doesn't affect others

Teacher's Manual: Electricity Part 2



Elaborate

Relate to real life:

- Ask students to give some common examples
- Series circuit: fairy lights, torch
- Parallel circuit: home wiring, car headlights

Ask higher-order thinking questions and discuss on it:

- What will happen if we add more cups in each method?
- Can we have different devices (lights, fans, heaters linked in a series circuit?

Give reasons for your answer

- Can you say why many appliances (fridge, TV, Geysers, mixer grinders, irons) can work simultaneously in our homes without any problems?
- But can you predict what might happen if you try to connect 3 or 4 devices to one electric outlet point (plug point)?

Extension:

Ask students to draw circuit diagrams of both series and parallel circuits in the game using symbols for mugs, cups, water and children.



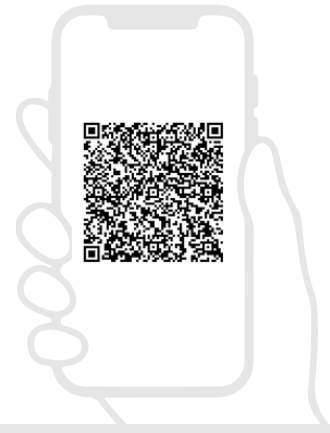
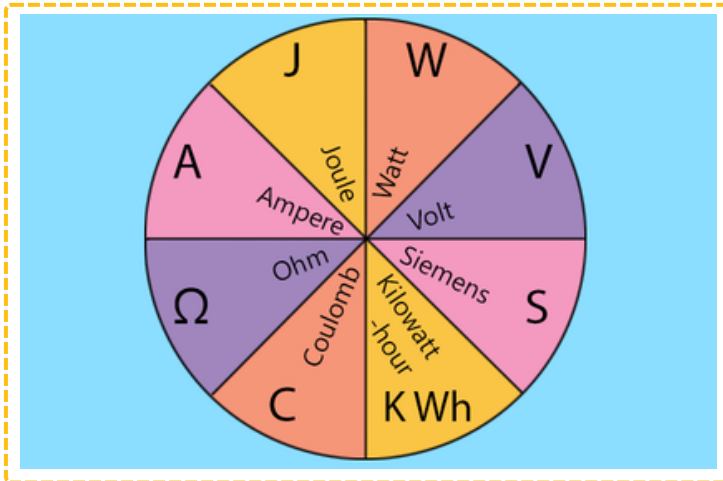
Evaluate

Ask discussion / notebook questions:

- What do the buckets, mugs, and cups represent in the circuit?
- How does the flow of water in the two methods resemble current in circuits?
- What happens if one device (cup) is removed in each method?
- Which method represents a series circuit and which one a parallel circuit? Why?
- Which type of circuit is safer and more useful for home wiring?

Teacher's Manual: Electricity Part 2

4.10 Electricity: Units and Terms



Scan or click the QR code to open the resource.

Learning objectives:

By the end of this lesson, students can:

- Understand the basic terms related to electricity (circuit, load, terminals, conductor, insulator, etc.)
- Learn about standard electrical units (Volt, Ampere, Ohm, Watt, etc.)
- Understand how scientific concepts connect with everyday experiences with electricity

Materials:

- Printed worksheet copies for each student
- Blackboard/chalk or chart for discussions
- A few sample materials (nail, pencil, comb, paper, wood, bicycle spoke) for demonstration
- Simple circuit set (cells, wires, bulb, switch) for verification

5E Lesson plan



Engage

Begin with thought-provoking questions from the resource:

- When your mobile battery runs out, what does it mean to 'charge' it?
- If a bulb glows dimly, what does 'low voltage' really mean?
- What do the terms 5W, 15W, or 60W on bulbs mean?

Encourage students to share their everyday experiences with these terms (mobile chargers, fans, bulbs).

Teacher's Manual: Electricity Part 2



Explore

Present a scenario: We use many words like voltage, current, and resistance, but do we really know what they mean?

Let the students read the resource and understand the terms and units related to electricity. Ask the students to read each definition aloud 1–2 times.

If students face difficulty in reading or understanding any definition, help them.



Explain

After reading, students can be called upon to explain the terms and units one by one.

Wherever needed, help the students in understanding them.

Use examples from daily life:

Look at a bulb at home. You will see Watts (W). On your charger, you'll see Volts (V).



Elaborate

Extend learning by connecting the terms and units to real-world contexts: Why is earthing important in homes?

We get Alternating Current (AC supply) at Home. A cell or battery provides Direct Current (DC)

Find out two devices or appliances in your house which work on AC or DC supply.

Small activity-

Ask students:

- Check the voltage requirement (voltage) of your fridge or Mixer grinder? Can you run them on a 110 volt electric supply?
- Give reasons for your answer

Teacher's Manual: Electricity Part 2



Evaluate

Quick exercises from the resource-

Match the correct pairs:

- Current → Ampere
- Voltage → Volt
- Resistance → Ohm
- Charge → Coulomb
- Power → Watt

Ask:

- Which unit is used to measure electric consumption in households?
- What is the difference between AC and DC?
- Why is resistance compared to a narrow bridge on a wide highway?

Homework:

Write a short note with examples about two terms and their units you find most useful in daily life.